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Cir. 7.
5,000, July, 1909.

Elementary Industrial Arts

IN

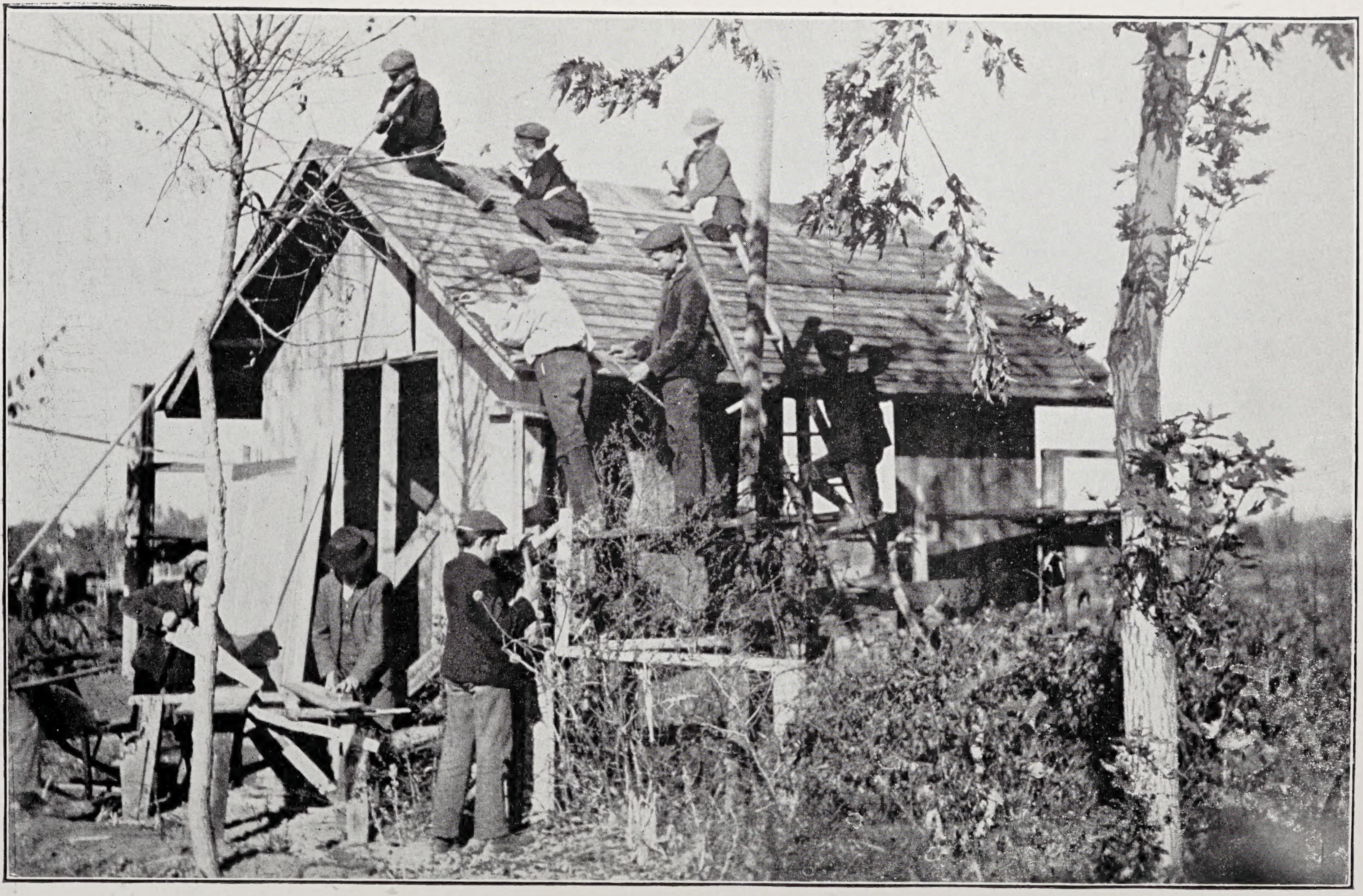
Public and Separate Schools of Villages and Towns

Explanatory and Descriptive Circular

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

ONTARIO
DEPARTMENT OF EDUCATION

TORONTO:
Printed and Published by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1909



Applied Manual Training.

824

Elementary Industrial Arts in Public and Separate Schools of Villages and Towns.

REGULATIONS.

1. The Public or Separate School Board of Trustees in a Village or a Town, that provides and maintains a department for teaching the Elementary Industrial Arts, employs a teacher with a Departmental Certificate in these subjects, and provides accommodations and equipment satisfactory to the Minister of Education, shall be paid by the Minister an initial grant not exceeding $50 and a subsequent annual grant of $30 for each school approved by the Minister, from any appropriation made by the Legislature for instruction in these subjects.

2. These provisions shall not apply to any School Board receiving grants for Manual Training. Manual Training can be satisfactorily carried out only where preparatory training is given in the Elementary Industrial Arts, and the grants made for Manual Training under Regulation 150, of 1904, cover both Elementary Industrial Arts and Manual Training.

3. The School Board shall provide the necessary tools, materials, and other requisites, with facilities for storing the same when not in use, and suitable classroom accommodation for carrying on the instruction.

4. The accounts of the Course in Elementary Industrial Arts shall be kept separate from the general school expenditure, and the grants made must be expended solely for this course.

5. Much of the work of the course in Elementary Industrial Arts may be done out of school hours, but a definite place must be provided for it in the time table, satisfactory to the Inspector of Technical Education.

6. On the report of the Inspector of Technical Education that the organization and the teaching are satisfactory, an annual grant of $30, in addition to the regular salary paid by the School Board, will be paid by the Minister out of any appropriation made by the Legislature for this purpose, to each legally qualified teacher who holds a certificate in Elementary Industrial Arts, and who gives instruction in accordance with the regulations of the Department of Education.

GENERAL AIMS.

The following is a summary of the general aims of the courses in the Elementary Industrial Arts,—

1. To stimulate intelligent appreciation of industrial life and processes.

2. To develop at an early age habits of industry, respect for labour, and a love for productive and constructive work.

3. To encourage the spirit of co-operation on which depends not only the success of the modern shop, but also the success of every individual life.

4. To bring the life and interests of the school more closely into touch with the working life to be lived after school days are over.

5. To reveal to the pupils to some extent their peculiar bent, so that the choice of an occupation may be the more intelligently made.

6. To give ability to read and make working drawings such as are used in the industries.

7. To give facility in the handling of common tools, and ability to put and keep them in good working order.

8. To give accurate ideas of the cost of labour, and value of material.

ORGANIZATION.

Suitable forms of work should be taken in every grade, being carefully planned so as to make adequate preparation for that of the next higher. Where practicable, one teacher, or where necessary two teachers, should take the whole of this subject, moving from class to class. In this way the teachers will be able to keep in view the final purpose and to regulate instruction and methods so as best to achieve it. Where the organization renders the employment of two teachers necessary, frequent conferences should be held between them so as to harmonize instruction and methods.

If there are a number of large boys in the school, the carpentry may well expand within a year or two, so as to include building a small shop on the school grounds and fitting it up for working purposes. (See Frontispiece.)

Under specially favourable circumstances it will not be difficult to include in the course the making of plans for the construction of farm buildings of the simpler sort. Exercises may be given in the sewing of leather and in the splicing of ropes, finding practical application in the mending of harness, making of halters, etc., as the necessities of the farm and home may require. Some exercises in painting and glazing may also be given, and opportunities are not lacking for applying the knowledge thus gained on the school or farm buildings.

As the work is intended to have special reference to the industries of the district, specimens of the articles manufactured, both complete and in process, should be collected, and thus the nucleus of a live museum formed, which would provide a valuable aid to the instruction given. Manufacturers are usually willing to donate specimens for this purpose.

Employers and manufacturers should be invited to give periodical talks to the pupils on the particular trades in which they are engaged, the articles they manufacture, the processes they undergo, the materials from which they are made, and the countries from which they come. The information thus obtained should be afterwards used for composition exercises, etc.

Every opportunity should be taken to show the pupils by practical examples that the work they are doing is calculated to be of industrial service to them. When working in any material, references to the trade in which it is employed should always be made. The pupils who show special aptitudes along these lines should have special facilities offered them to induce them to stay a year longer in school in order to take up advanced work.

Visits to shops, buildings, factories, etc., should be undertaken under guidance. Before these visits the pupils should be given some information about the particular trade concerned, and receive some instruction regarding the vital points of the industry. After a visit of this kind the pupils should always be required to reproduce in intelligible form the information gained.

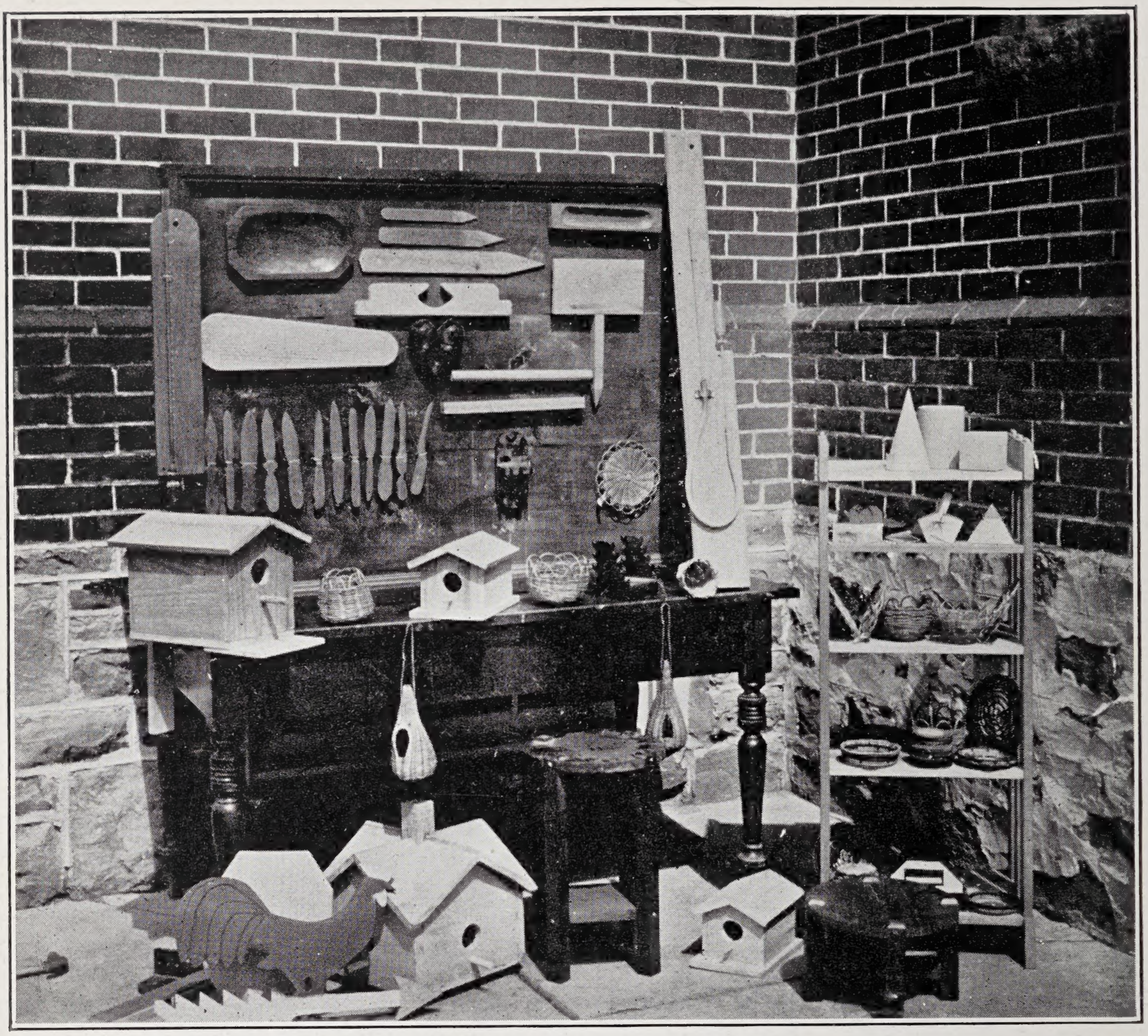
Periodical exhibitions will do much towards increasing the interest of the parents and thus securing their co-operation. The local press should also be made use of in this connection. In the preparation of work for an exhibition the teacher should guard carefully against the temptation to actually perform any of the operations. Every pupil should be able to say, with truth, that the whole of the work is the product of his own hands. It should always be remembered that the training of the pupil, and not the making of the object is the final end in view.

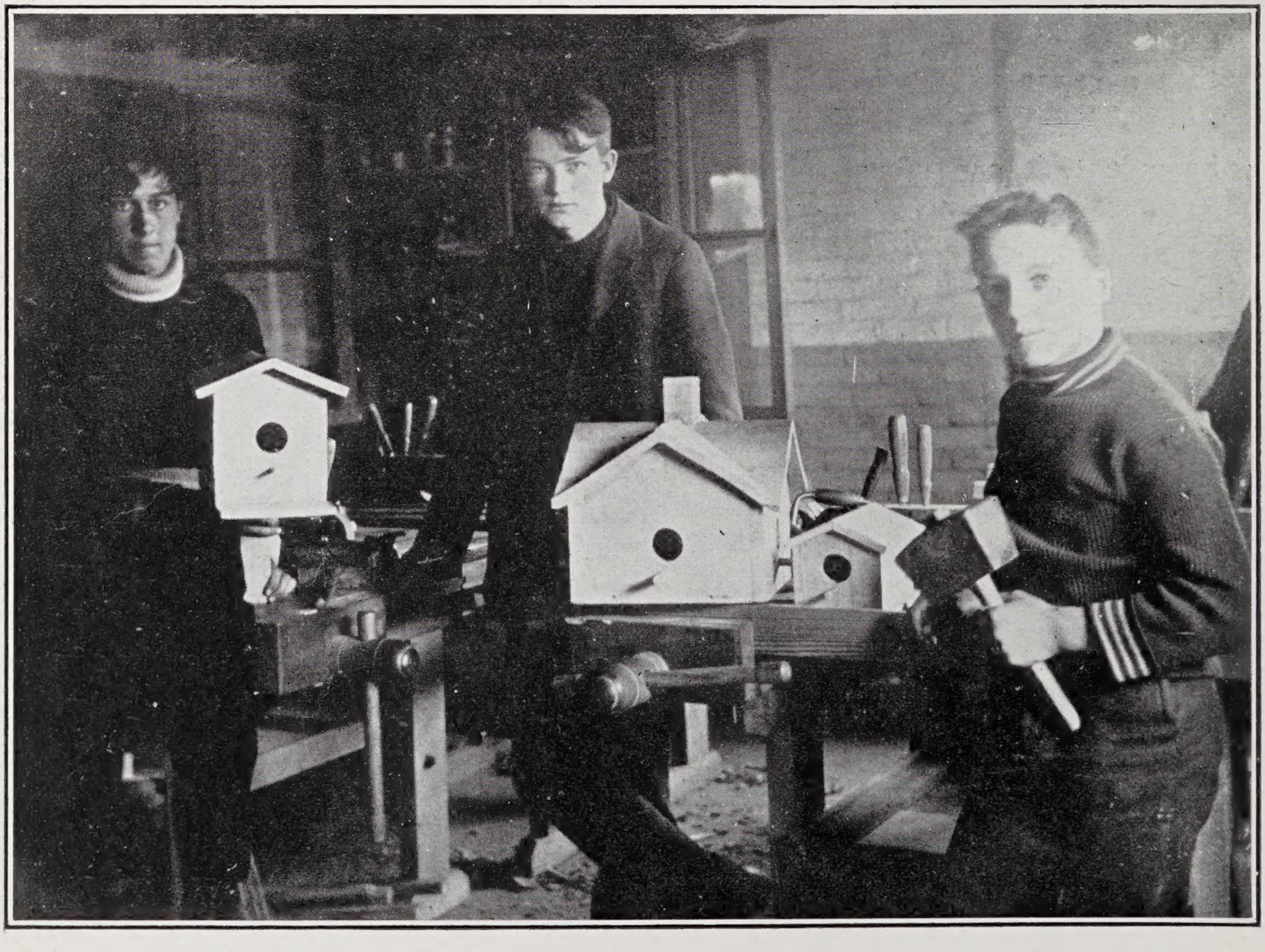
ACCOMMODATION AND EQUIPMENT.

In the higher grades the provision of the necessary space will no doubt be found to be the most pressing problem. It is highly desirable that a separate room be provided. Though this is a great advantage, the Minister does not insist upon it at present. If the school possesses a basement, it can often be fitted to carry on the work, though a basement should not be chosen if other space is available. The illustrations on page 6, show the basement of the Rittenhouse School adapted for bench work. In order to economize space this school is fitted with double benches. Individual benches are, however, recommended where space is available. Several firms in the Province manufacture these, or they may be made locally, the greatest care being taken to have the wood thoroughly seasoned. Types of such benches are shown on pp. 7, 8, and 9.

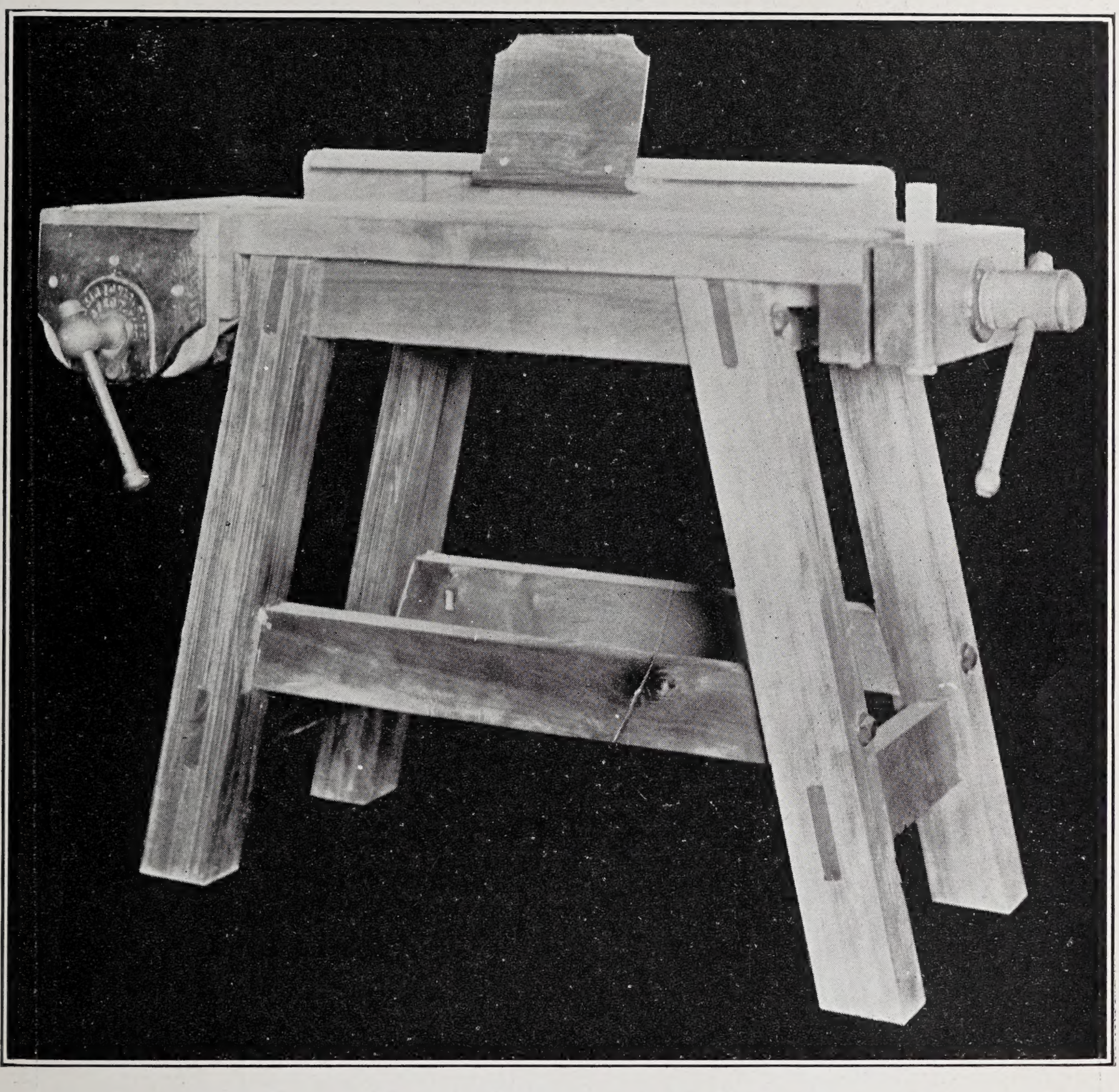
In the primary grades no addition to the furniture of the ordinary classroom is really necessary, though a large flat topped table will always be found to be of great service. Where space will not allow of such provision, two boards nine or ten inches wide and jointed together in the form of a table top may be placed across the tops of the desks. This may be the length of two desks and the aisle between them. When not in use the top may be placed alongside the wall.

For the necessary tools, a small box or tray should be provided, having a special place for the scissors, knives, pencils, erasers, rulers,

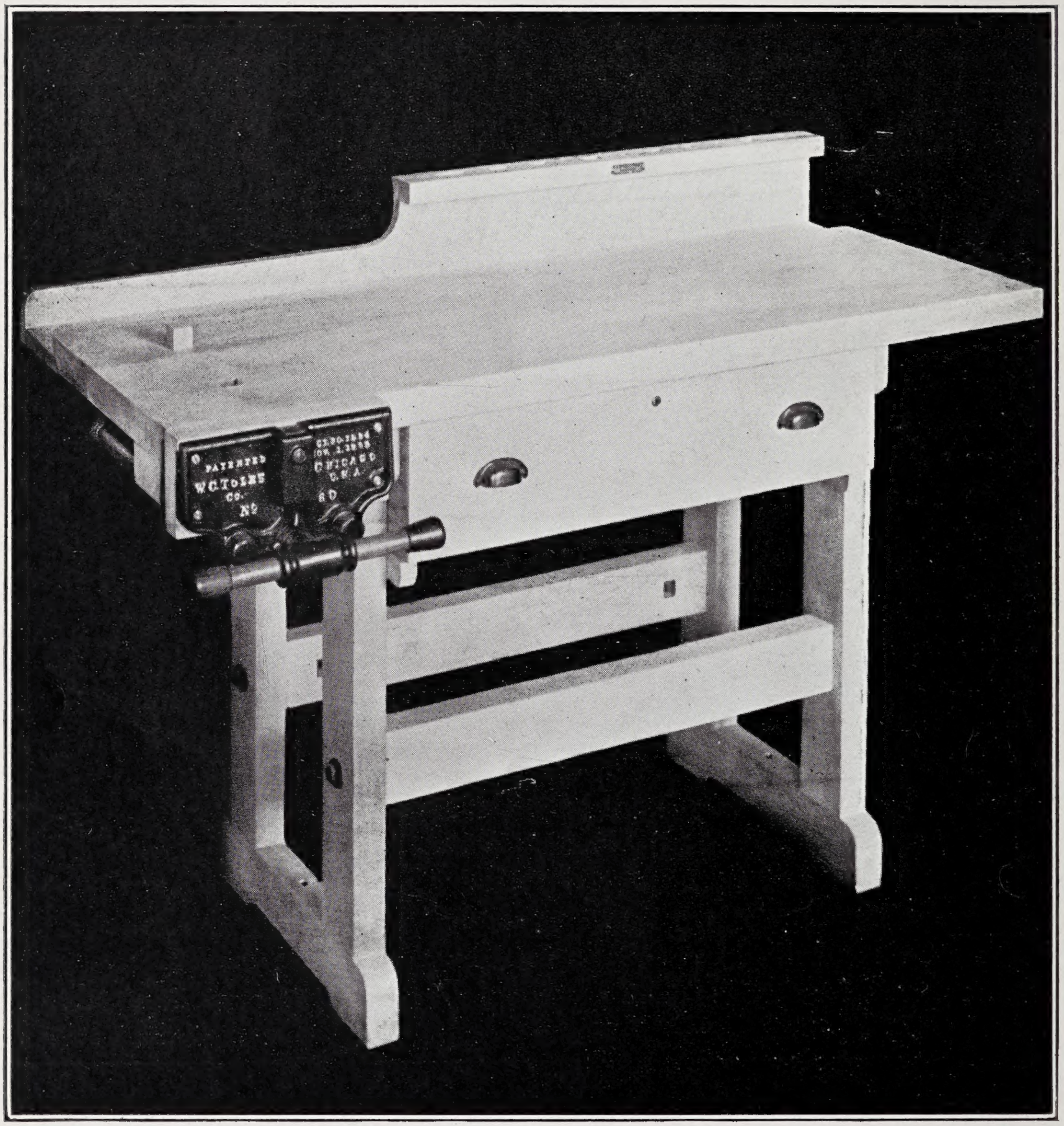




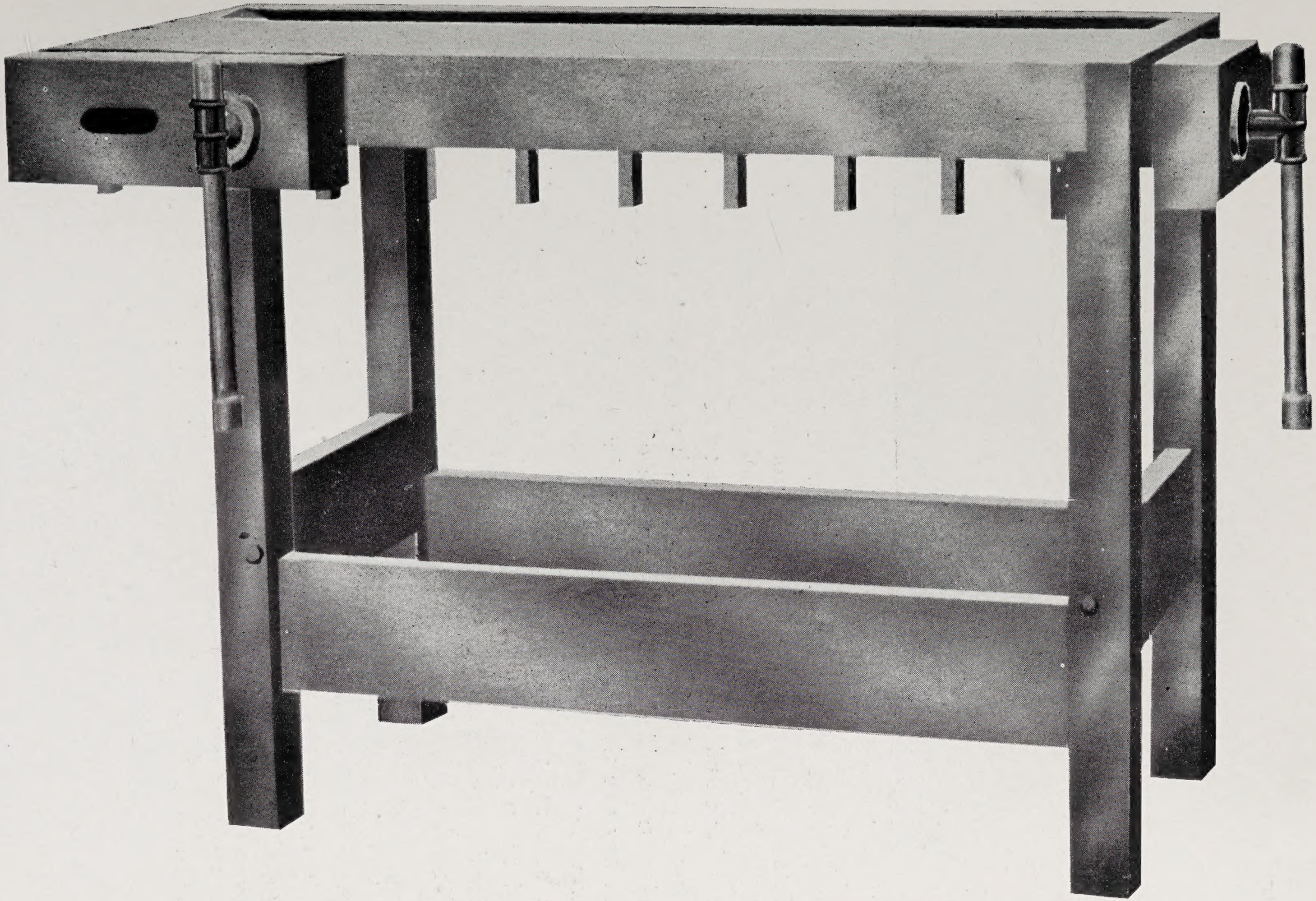
Woodwork in the Basement of Rittenhouse Pubiic School.



Single Manual Training Bench with Two Vices.



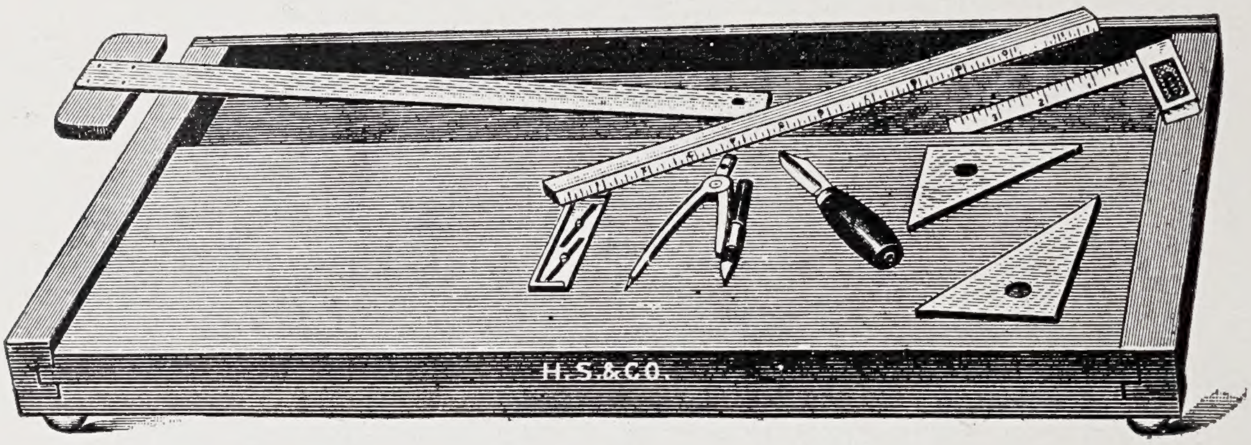
Single Manual Training Bench with One Vice and a Drawer fitted.



Single Bench with Two Vices.

paste, etc., to contain the whole equipment needed for one class. This box can be easily carried from one room to another.

Where industrial work is done, as it will be in the majority of cases, at the ordinary school desk, it is advisable to provide a sheet of stout mill board in order to protect the top. Another convenient method is to provide a tray as shown in the illustration below.



Desk Tray.

Where single benches cannot be installed, a long narrow bench fitted to the wall of the classroom will best meet the conditions. This should be provided with one or more vices according to the space available and the number of pupils to be accommodated. Such a bench should be rigid and be provided with a smooth-working vice. It should also be provided with as many sets of tools as there are pupils working at any one time. These tools may be kept in racks at the back of each working space; and, on leaving, each pupil should be required to see that every tool is in its place. With the aid of the working drawings given on pages 11, 12, 13, and 14, a suitable bench can be built by the local carpenter at little cost.

The following is the equipment for the course:—

Paper Work. Pencil, scissors, ruler graduated in inches, halves, quarters, and eighths, mill board for each pupil to protect the desk top, paste or other adhesive, and paper for drawing and construction.

Cardboard Work. In addition knife, compasses, set square for each pupil, one ticket punch for every five pupils and cardboard of various weights.

Knife Work. Knife, pencil, ruler, compasses, try square for each pupil, three or four small hammers, two hand screws, oil stone, oil can, and assorted bradawls for the class, and working material.

Elementary Metal Work. Flat pliers, round nosed pliers, rule and pencil for each pupil, snips for every four pupils, two or three small hand vices, small hammers, punch and paint brush for general use.

Bench Work. For bench work in wood there should be provided for each bench or bench place, one each of the following tools:—

Bench Hook, Drawing Kit, Pair Compasses, Rule 2 ft., Marking Gauge, Try Square, Jack Plane, Firmer Chisel 1 in., Firmer Chisel ½ in., Firmer Chisel ¼ in., Tenon Saw, Bench Whisk.

FIG. 1.

BENCH, FIXED TO THE WALL OF CLASS ROOM, FOR TWO PUPILS.

THIS MAY BE TAKEN AS REPRESENTING TWO UNITS, WHICH MAY BE INCREASED INDEFINITELY, ACCORDING TO THE SPACE AVAILABLE.

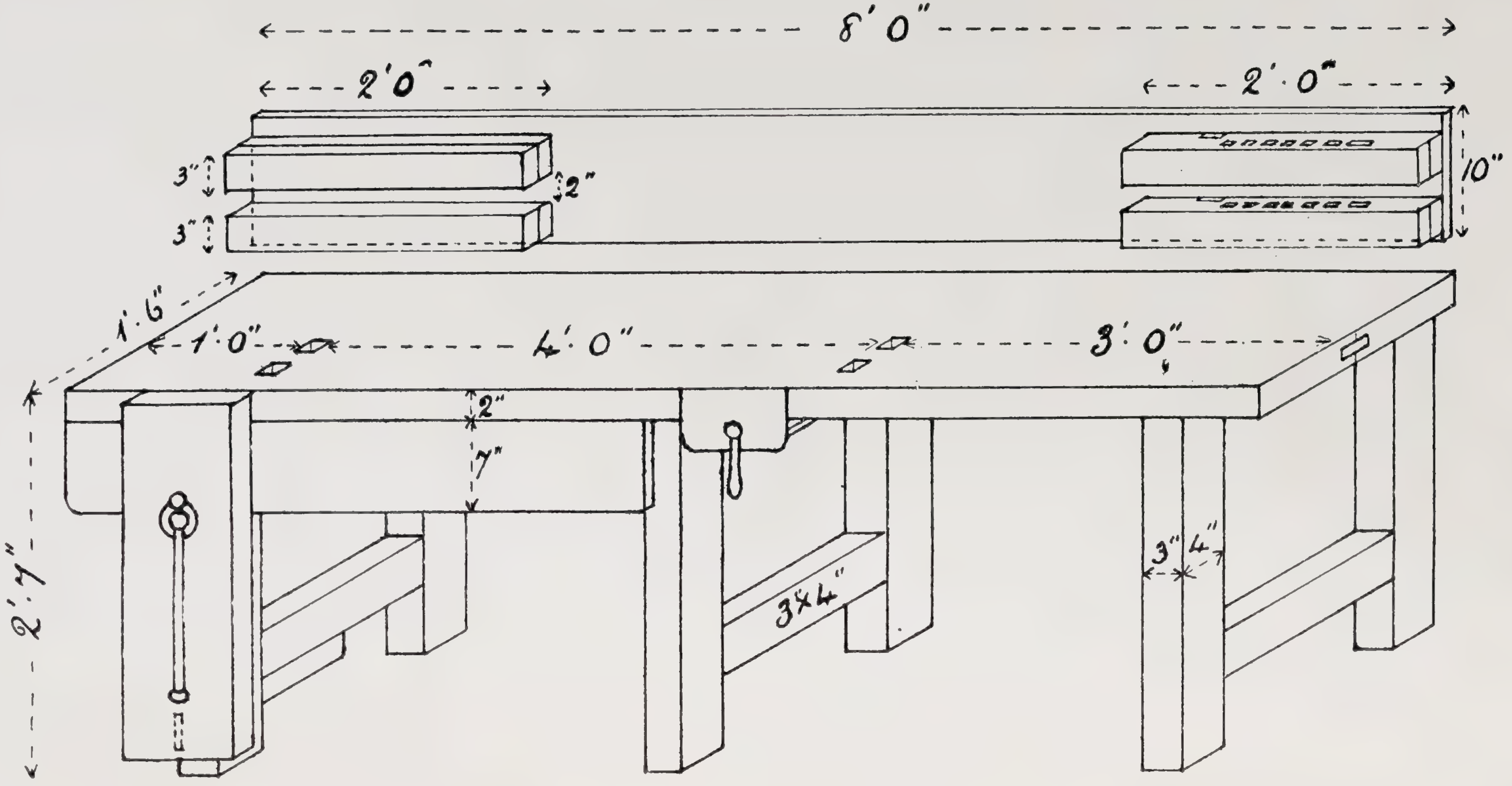
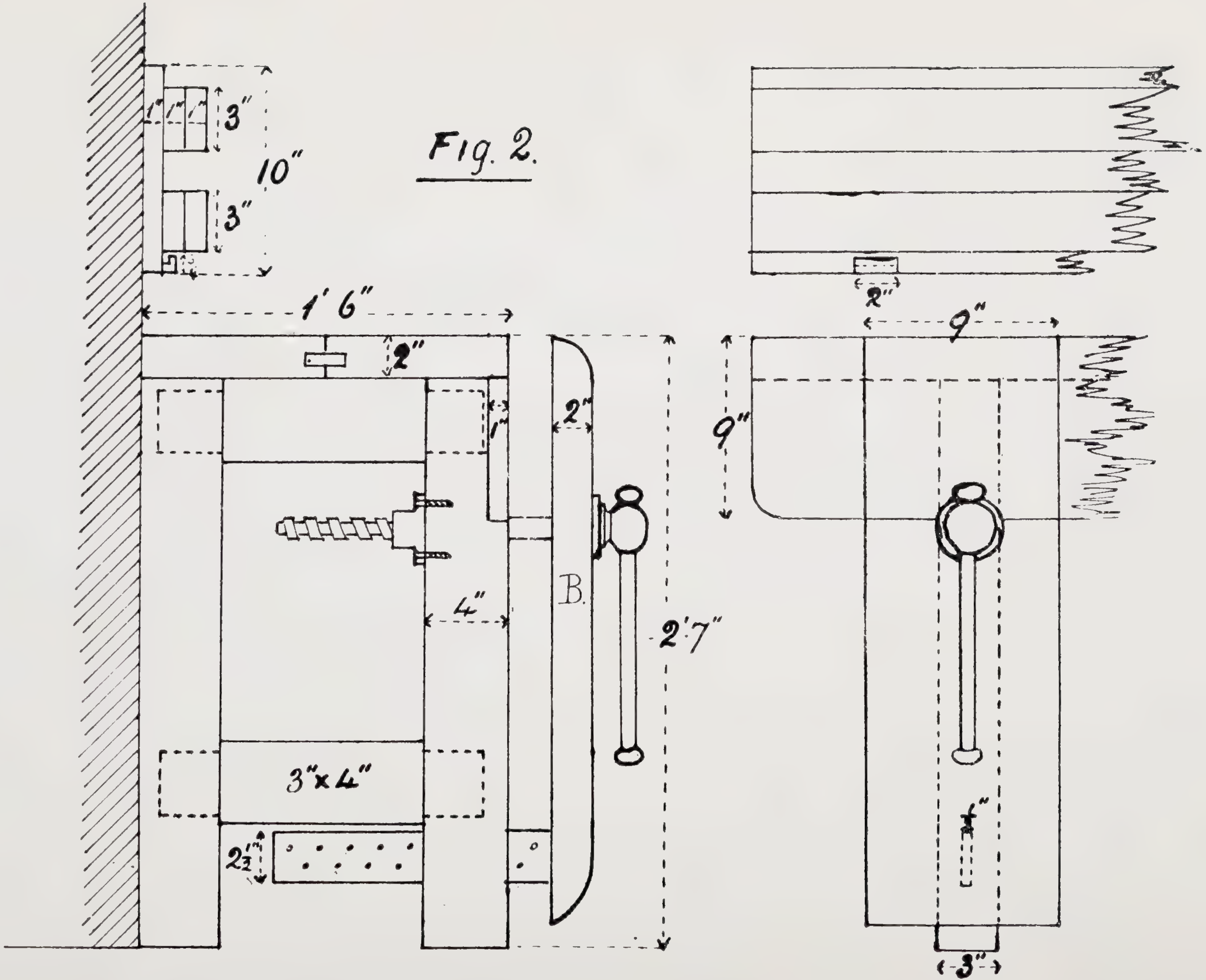
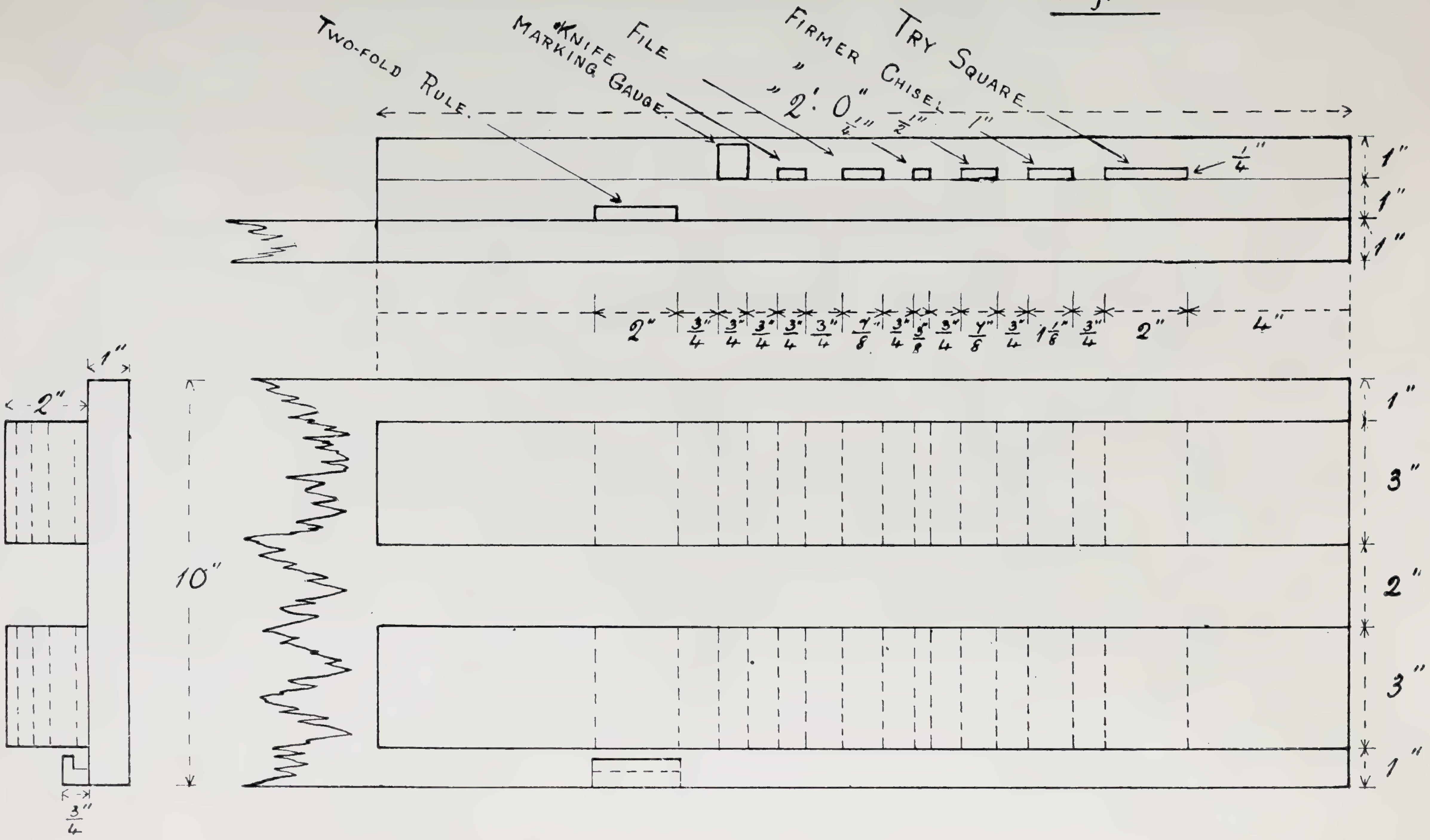


Fig. 2.



END VIEW OF BENCH SHOWING METHOD OF FIXING TAIL VICE, B.

Fig. 3.



Enlarged View giving details of Rack for one set of Bench Tools.

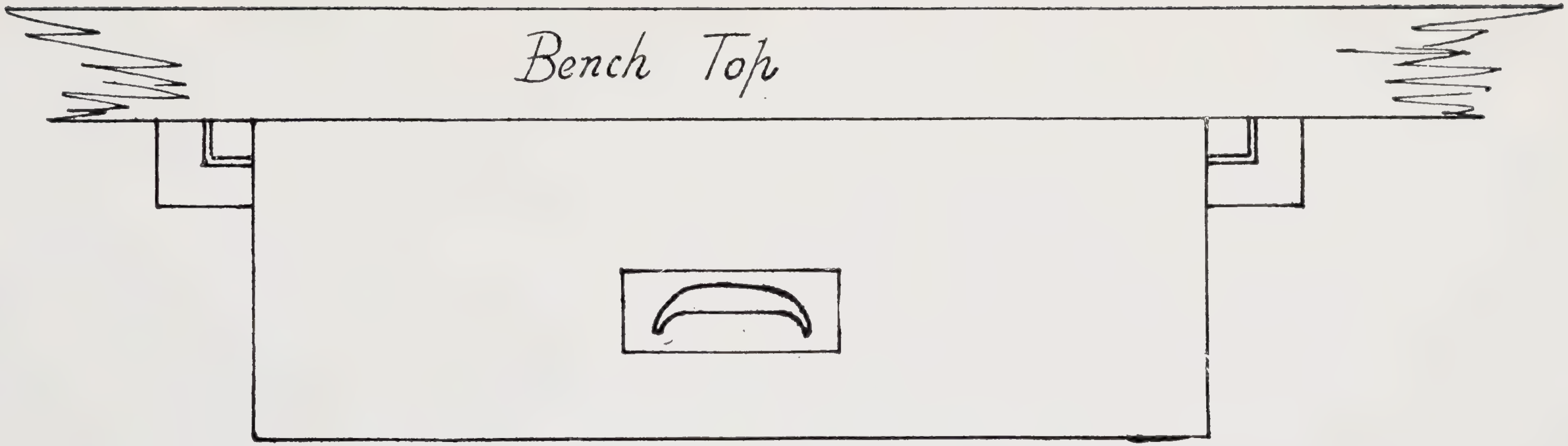


Fig. 4, Sketch Showing Simple Method of Fixing Drawer to Bench Top

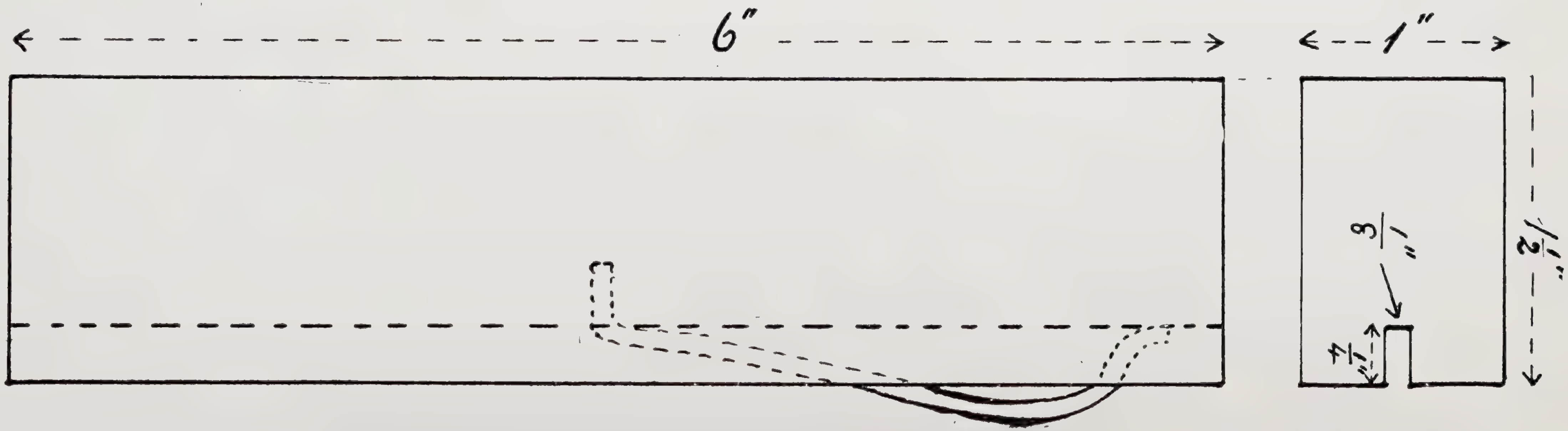
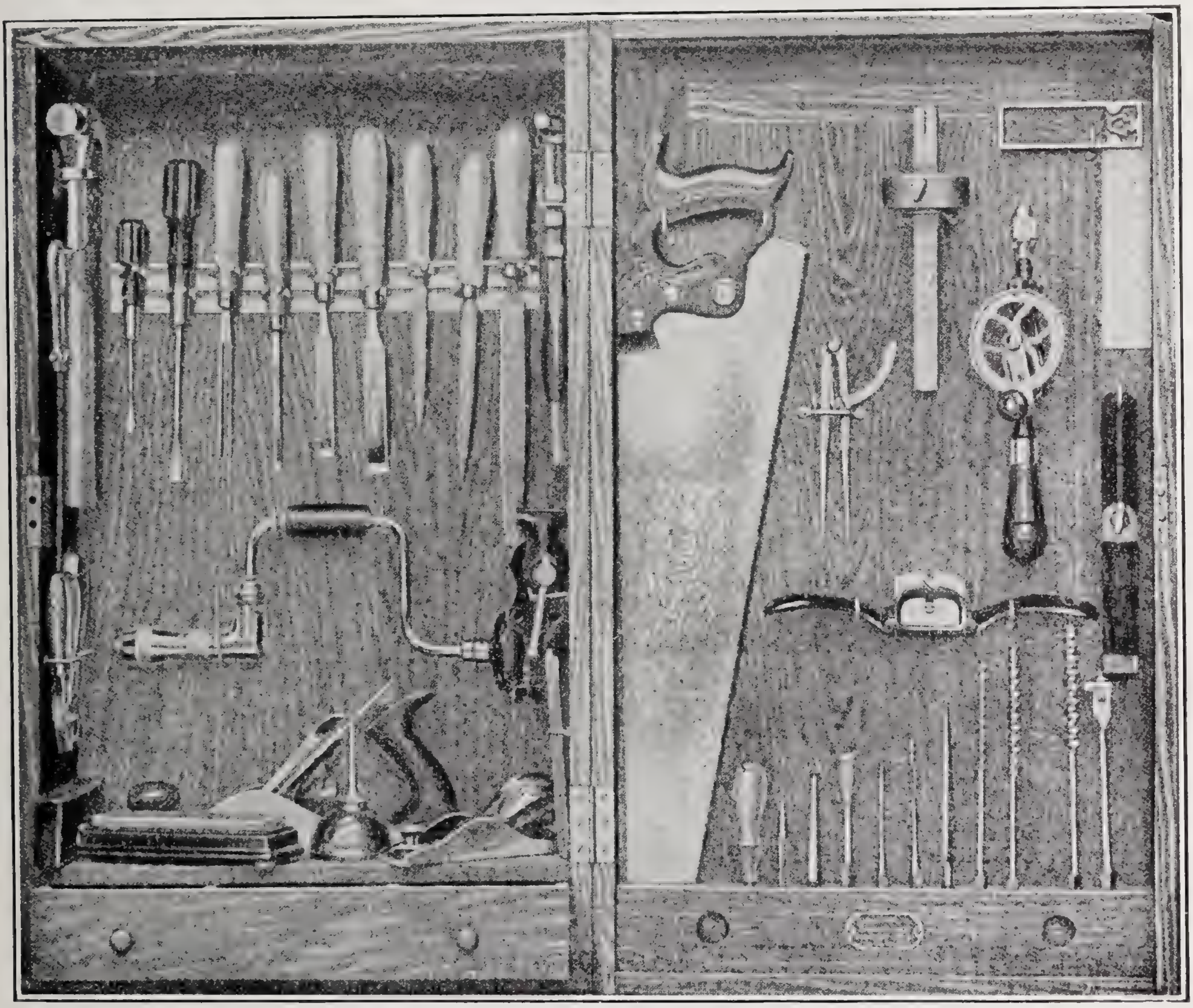


Fig. 5, Plan and Elevation of Bench Stop Shewing Method of Fixing Spring.

The following general tools, smoothing plane, try square 12 in., two screw drivers, two braces with assorted bits, metal and wood countersinks, one jointer plane, two gimlets, two bradawls, one bevel, one mortise gauge, two nail sets, one wood hand screw, one pair pincers, one pair wing dividers, one pair cutting pliers, four hammers, one hatchet, one pad saw, one rip saw, one cross cut saw, one grindstone.

A chest or cupboard should be provided to hold the above general tools, which should be so placed that their cutting edges are protected; and, as it is impossible to do good work without tools in proper condition, the greatest care must be taken of them. Before every vacation both bench and general tools should be wiped with an oily rag and placed carefully away, out of the reach of damp, in order that rust may be avoided. When it is desirable to save space, a tool cupboard may be conveniently fitted within the framing of the bench.



Home Tool Cabinet.

In addition to the above general equipment every school should have a large tee square, two set squares, 45° and 60°, a graduated rule and a pair of compasses for blackboard use.

A collection of woods grown in the neighbourhood of the school, should be made. Each specimen should be so prepared as to show horizontal, tangential, and transverse sections, and should be labelled by number and not by name so that the collection may be used for exercises in identification. Attention should also be paid to the growing tree, so that it may be recognized by its shape, leaves, bark, etc.

The pupils should be encouraged to fit up where possible a home workshop in the basement or shed. In case a basement is used the tools should be lightly rubbed with oil after use. Under proper guidance the pupils can build benches for themselves, and get together a small collection of good tools. Cheap sets should be avoided.

The illustration given on p. 15 shows a home tool cabinet, and the same arrangement may be readily adopted or it may be adapted to store the general tools provided for use in the school.

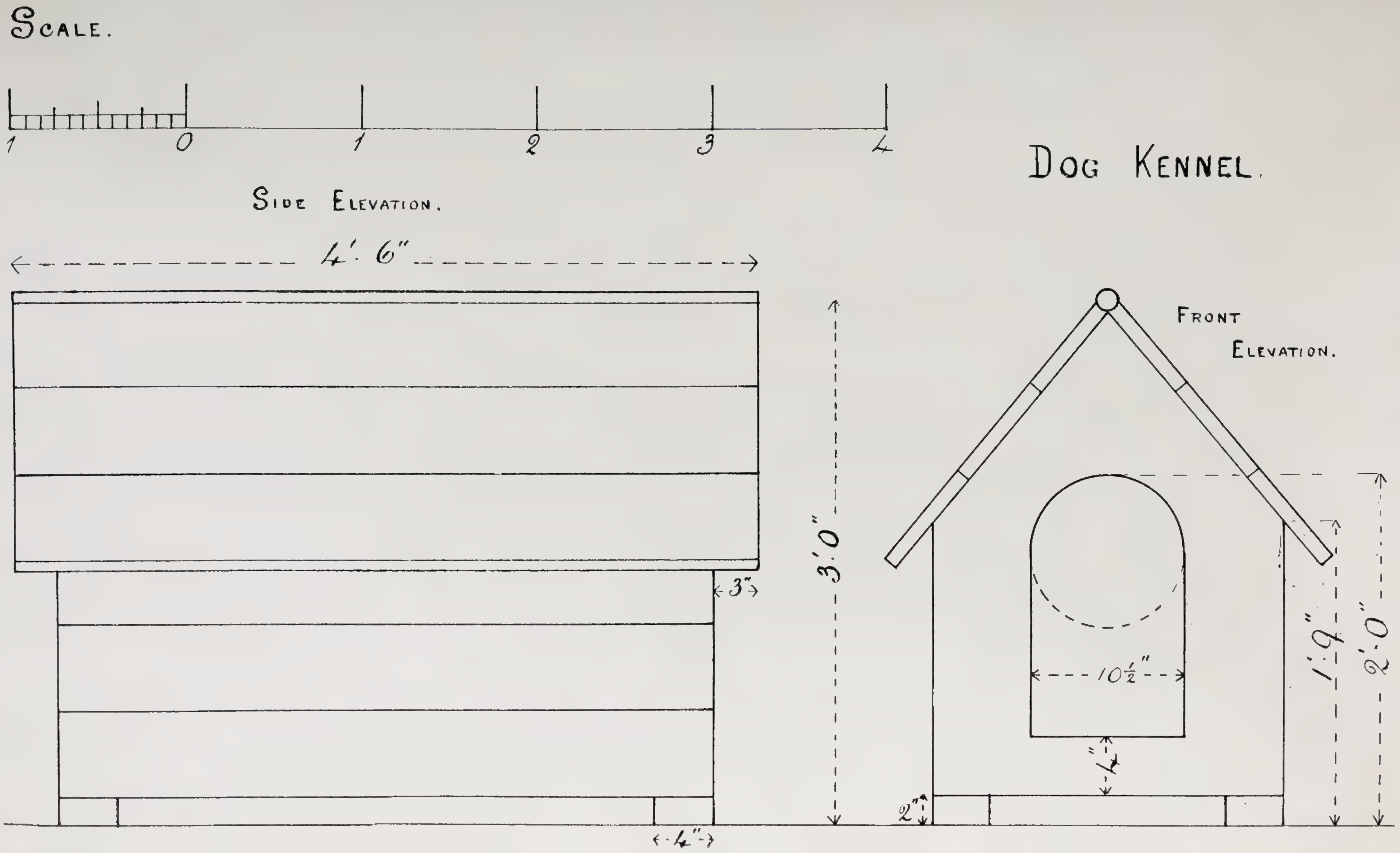
DETAILS OF THE COURSE.

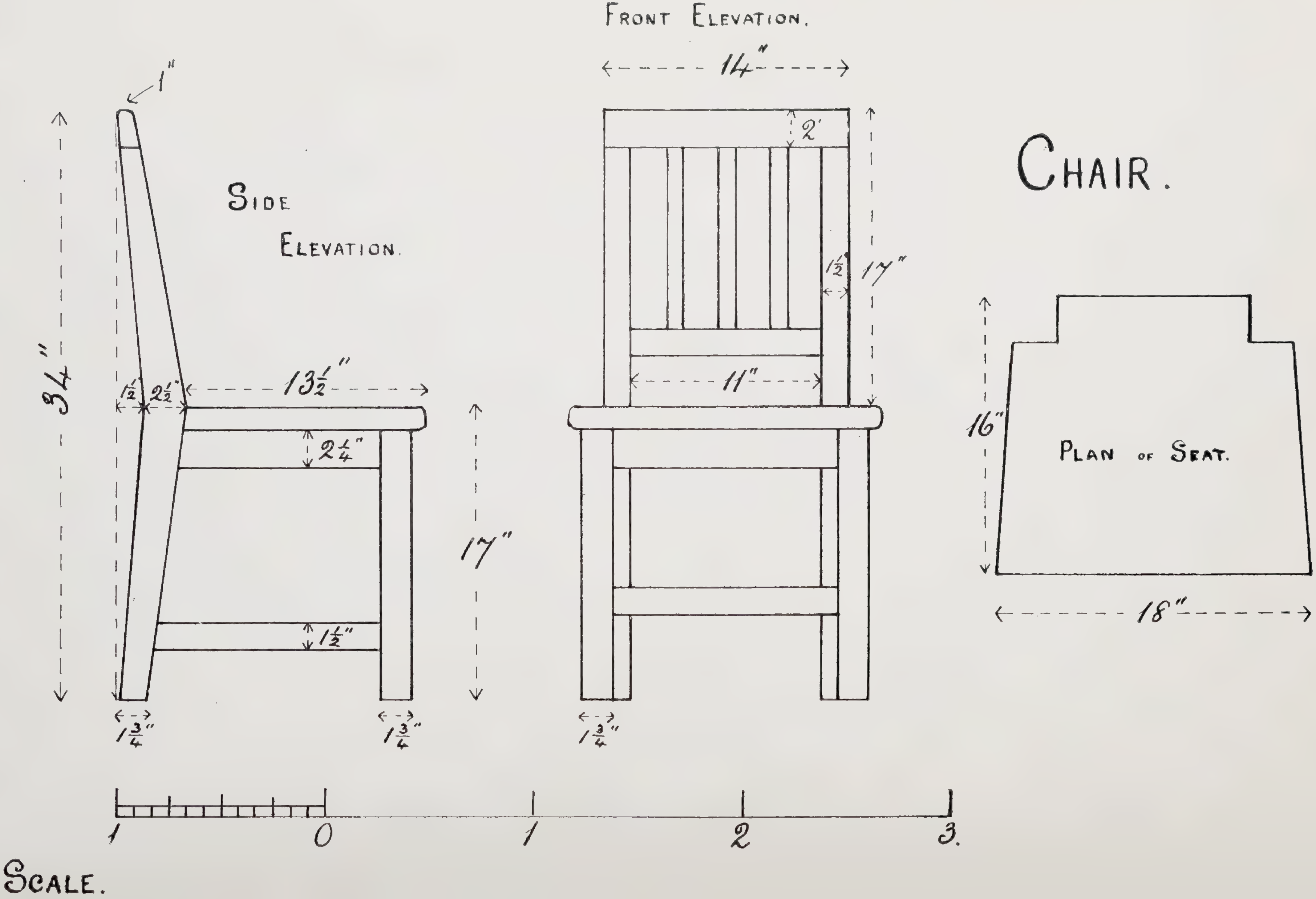
Drawing. It should be kept in view first and always that drawing lies at the base of every industry. Every object and every building, whether it be a simple cottage or a gorgeous cathedral, begins with a plan, and the successful carrying out of the project depends on the plan being faithfully followed. "First plan your work and then work your plan." The individual who can draw with ease and accuracy, can gain skill in any kind of manual industry much more quickly than would be possible without such power.

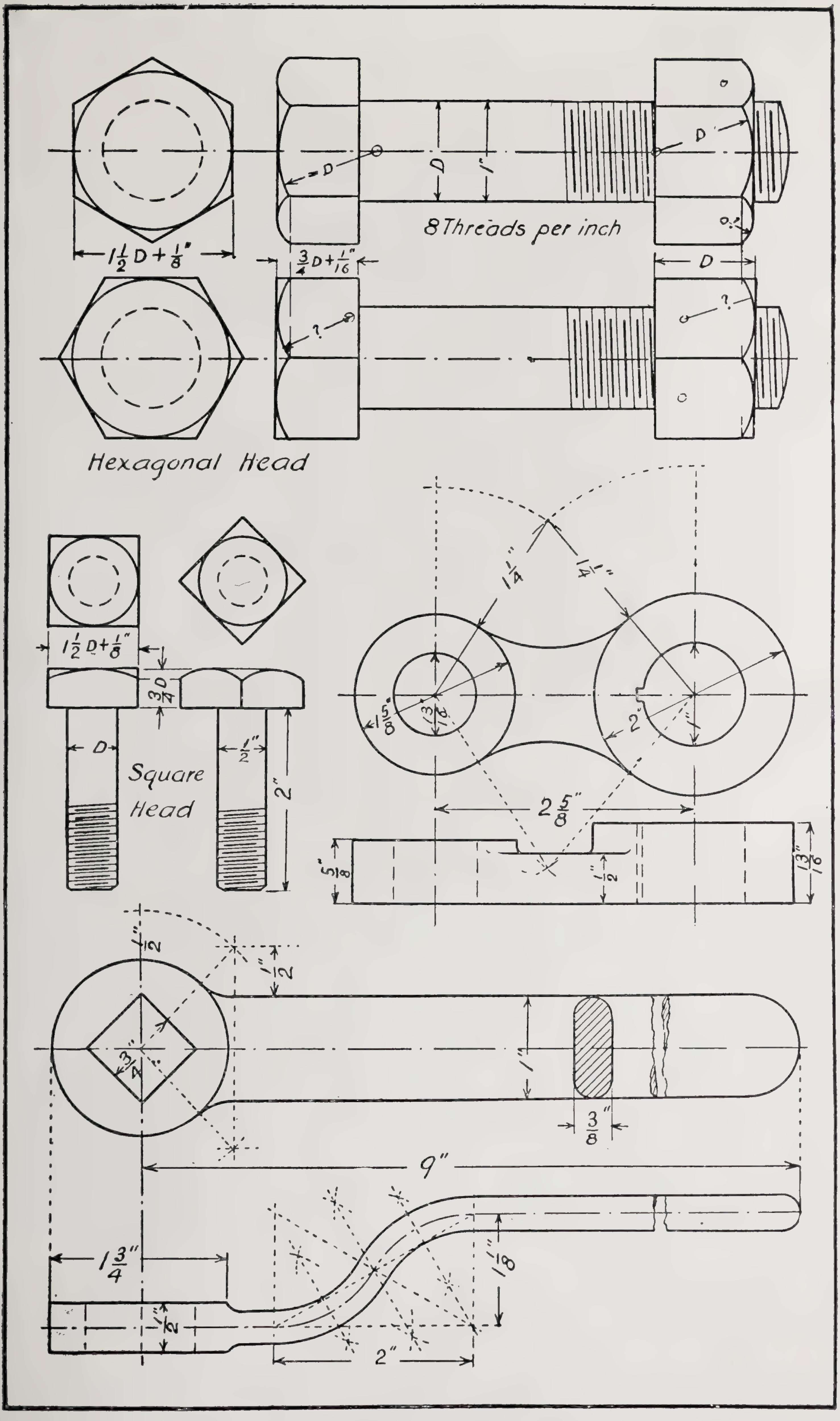
At first, objects will be drawn full size with ruler, and afterwards to a simple scale. Specimen drawings of a dog kennel and chair are shown on pp. 17 and 18. The measured drawing is a valuable exercise. Doors, gates, classrooms, cupboards, yards, gardens, tables, etc., can all be measured, and a simple scale worked out. As the pupil advances, simple plans, elevations, and sections will be introduced, care being taken to explain every term required, and to teach the correct method of using the necessary instruments. Measurements should be carefully inserted, and from the first the greatest attention should be paid to accuracy. A simple style of lettering should be used, and no script should ever be allowed on a working drawing. The plates on pages 19 and 20, show the usual lettering, dimensioning and conventional lines generally used in modern industry.

From the third form up, the common drawing instruments—board, tee square, set squares, compasses, and scale should be introduced and their correct use insisted upon. Together with this use of instruments the practice of free hand sketching should be largely made use of. The ability to sketch rapidly and accurately any piece of construction is of great educational value as well as of direct industrial value.

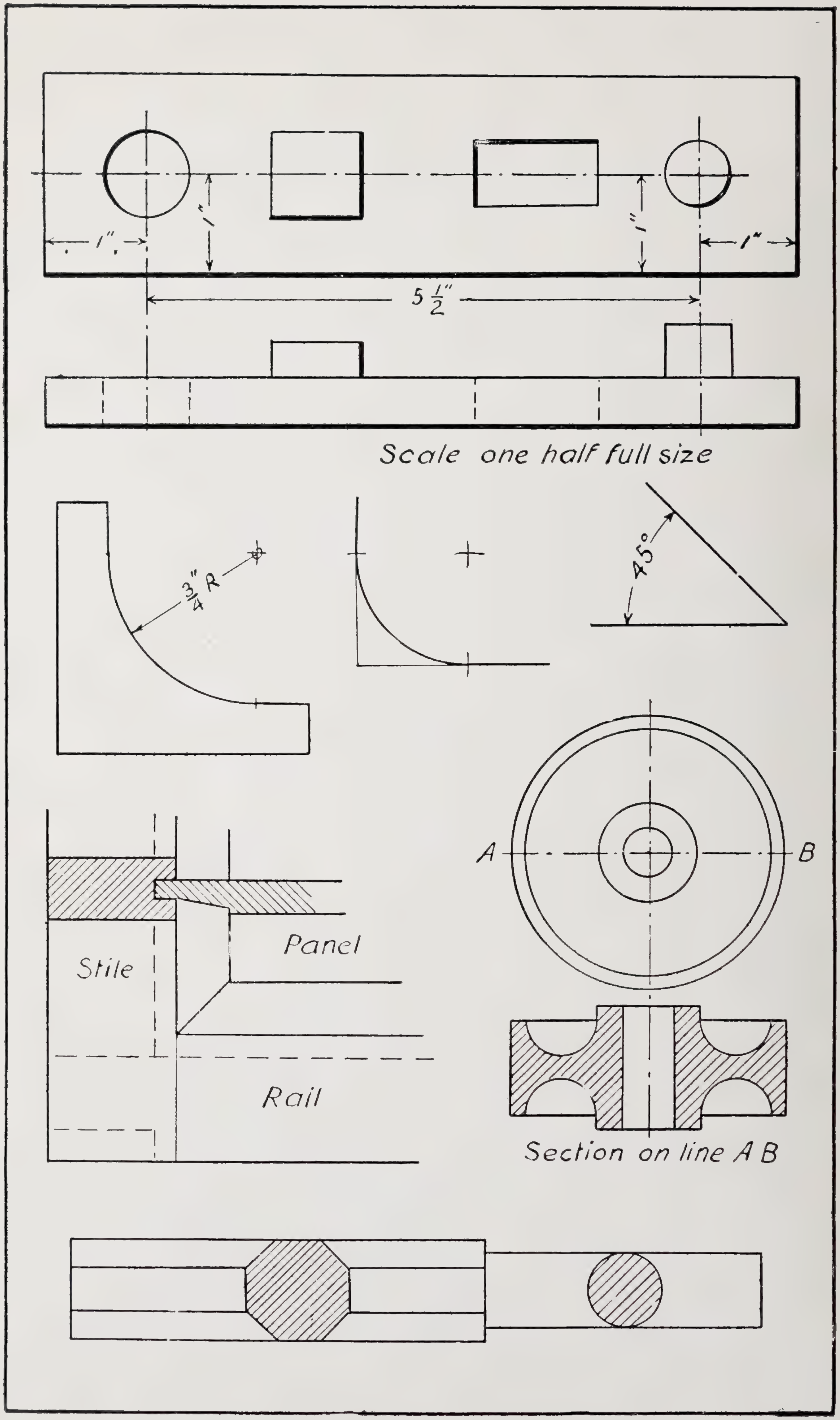
DOG KENNEL.


SCALE.
1
0
1
2
3
4
SIDE ELEVATION.
4' 6"
3"
4"
3' 0"
FRONT ELEVATION.
10½"
4"
2"
1' 9"
2' 0"


CHAIR.
FRONT ELEVATION.
14"
2'
1½
17"
11"
SIDE ELEVATION.
1"
34"
½
2½"
13½"
2¼"
1½"
17"
1¾"
1¾"
1¾"
PLAN OF SEAT.
16"
18"
1
0
1
2
3.
SCALE.

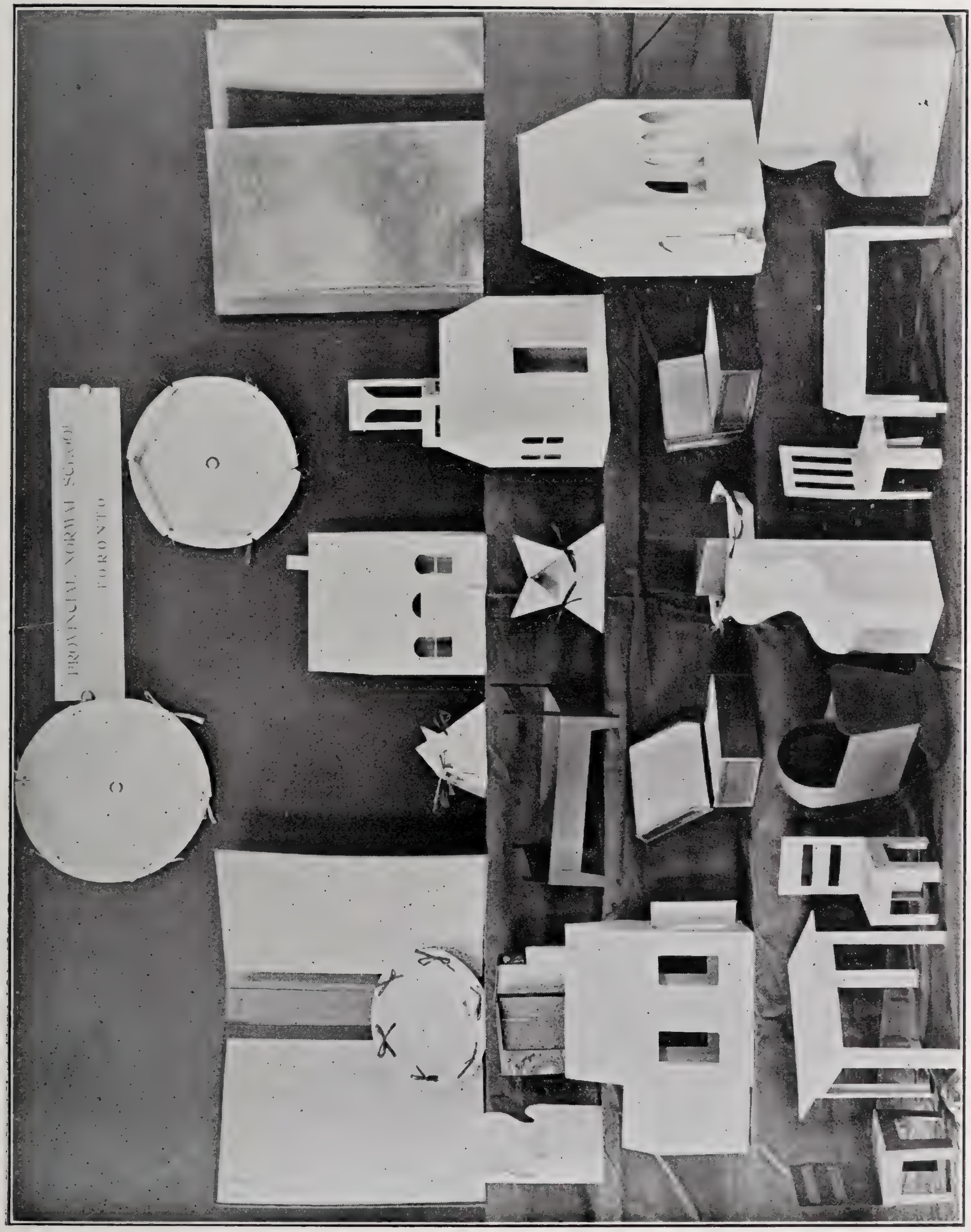


Working Drawings.



Working Drawings.

The common geometrical terms and figures, and their construction should be carefully taught and frequently practised, as no progress in mechanical drawing can be made until they are thoroughly known.



Paper and Cardboard Modelling.

Simple tracings and blue prints, as used in the ordinary shop, are also most important.

At the end of the course every pupil should be able to read and to make such working drawings as are used in the local industries, so that when he goes to work he will not have to wait for the explanations of the foreman, thus increasing materially the cost of production.

PAPER AND CARDBOARD WORK. (Illustration p. 21). This work will include the common geometrical figures, type solids, and objects based on them. In the very early stages the various objects will be made almost entirely by folding; and generally speaking material less than four inches square should not be used. As the work advances the paper will be replaced by thin cardboard and this by stouter.

Here the working drawing has to be made on the actual material, and there is no need to make the drawing on paper first. Errors in the drawing will plainly show in the finished object, unless corrected. All the typical solids should be made in cardboard, and these and the other objects constructed may be used afterwards, with good effect, for rapid sketching.

In all the practical work throughout the school, every effort must be made to economize time in the distribution of tools and material. Unless care be taken, and a systematic method adopted there will be much waste.

CLAY MODELLING. (Illustration p. 23.) Clay may be used in the manufacture of common objects, such as plates, cups, saucers, flower pots and simple vases. Grace and beauty of form are all-important Much attention must be paid to the condition of the clay.

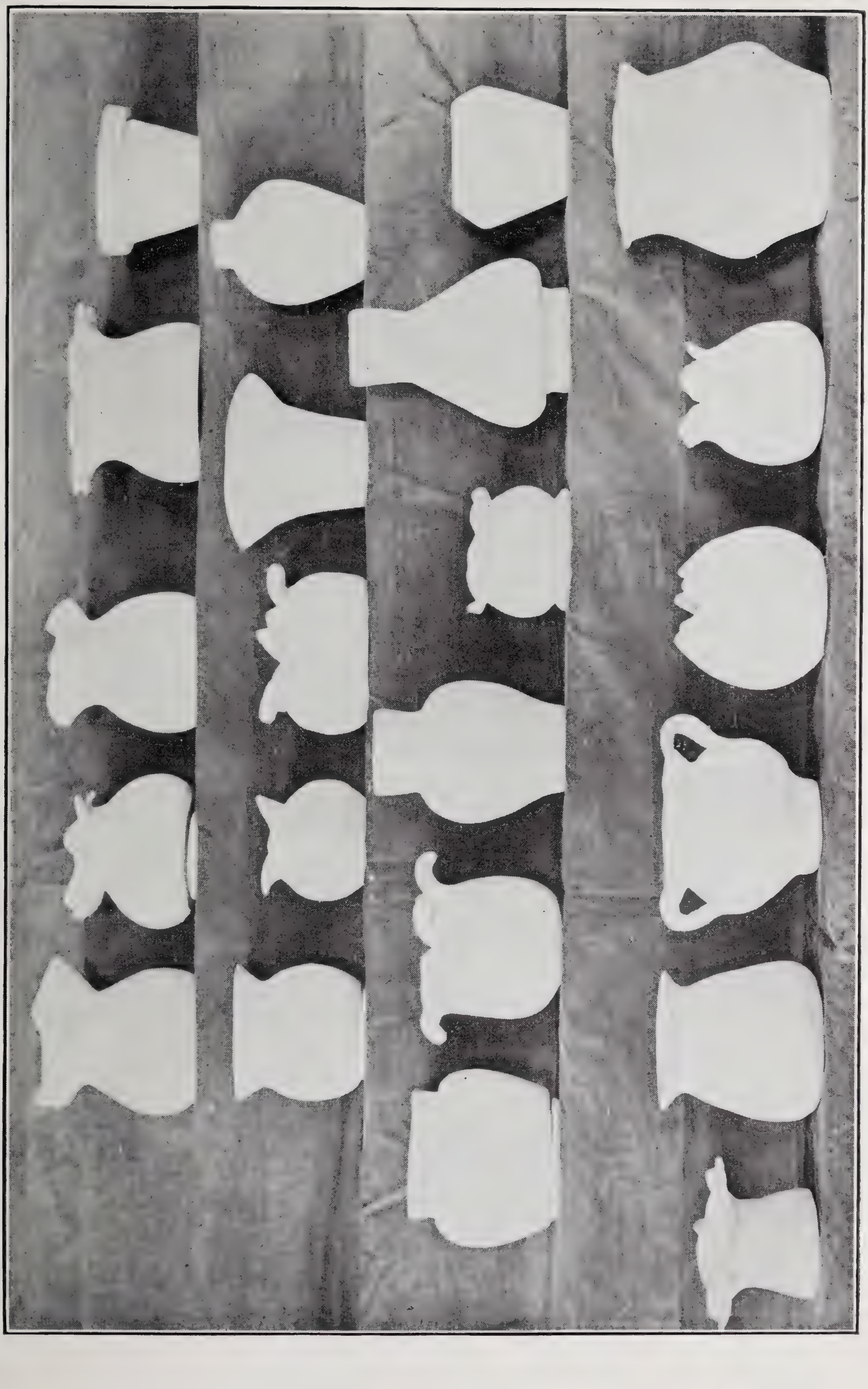
There are two main phases of clay work, —

1. Representation, including animal and plant forms, architectural details, etc. This is really drawing in three dimensions.

2. Clay modelling as an industry including the various products made in ceramic manufacture. In this course the subject should be largely taught from this standpoint.

Some exercises suggested are :—

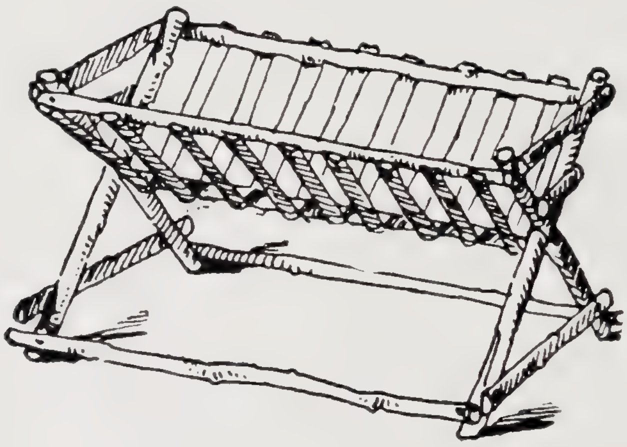
1. The tile, to teach the manipulation of the material.
2. Object such as shallow bowl, candle holder or match holder.
3. Small, simple, well finished bowl.
4. Other than round shapes such as rectangular tray or box.
5. Cup and saucer, plate, bowl, etc., full size.
6. Bowls and vases for special uses such as fruit, flowers, candy, etc.
7. Jar with cover.
8. Vases with handles.
9. Designs for various objects to be first planned on paper, and carried out to size specified.

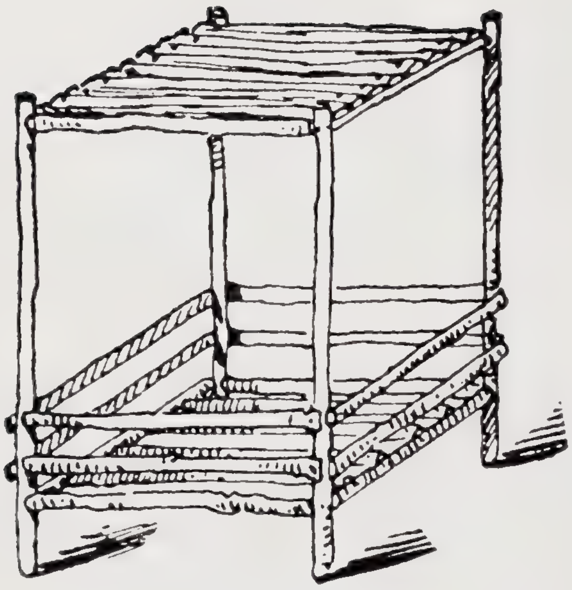


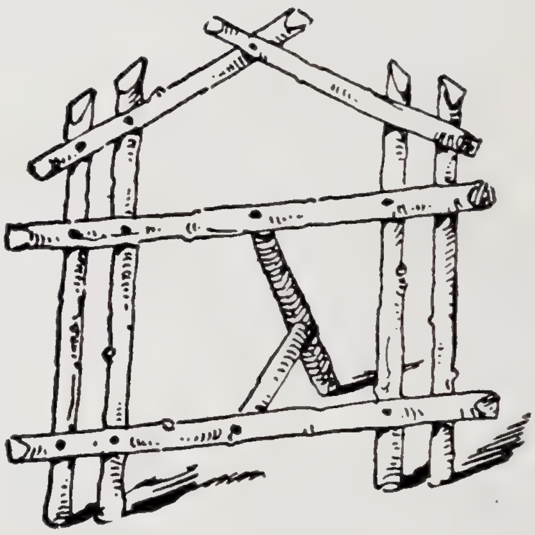
Clay Modelling.

After a year or two of this work, a simple kiln for burning might be built in the school yard.

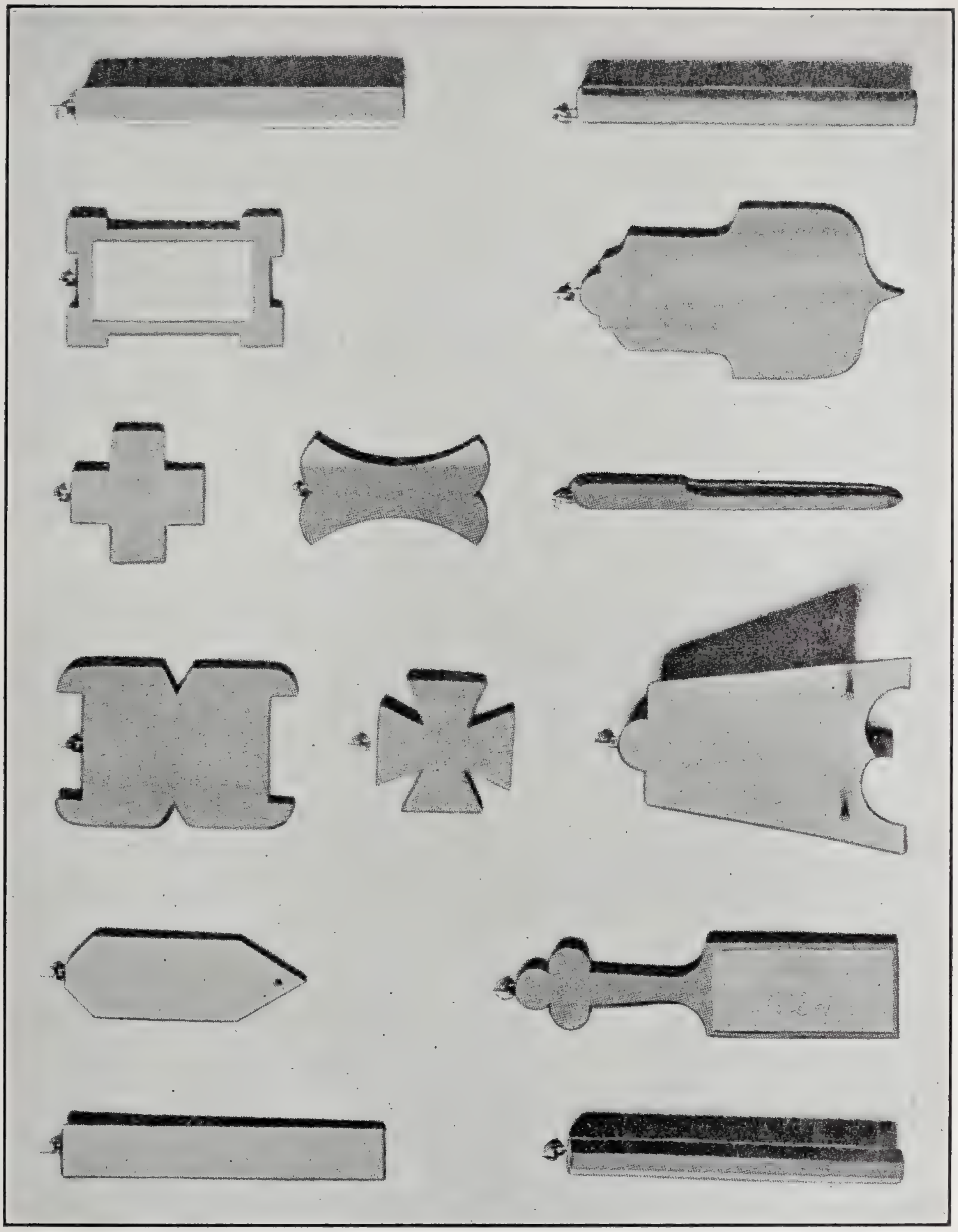
Knife Work in Thin Wood. This forms an excellent introduction to ordinary bench work in wood. The wood is supplied planed to thickness, and should be straight grained and free from knots. Basswood is very suitable. Each pupil should be taught to sharpen his own knife. Knives must be kept in good condition if satisfactory work is to be done.







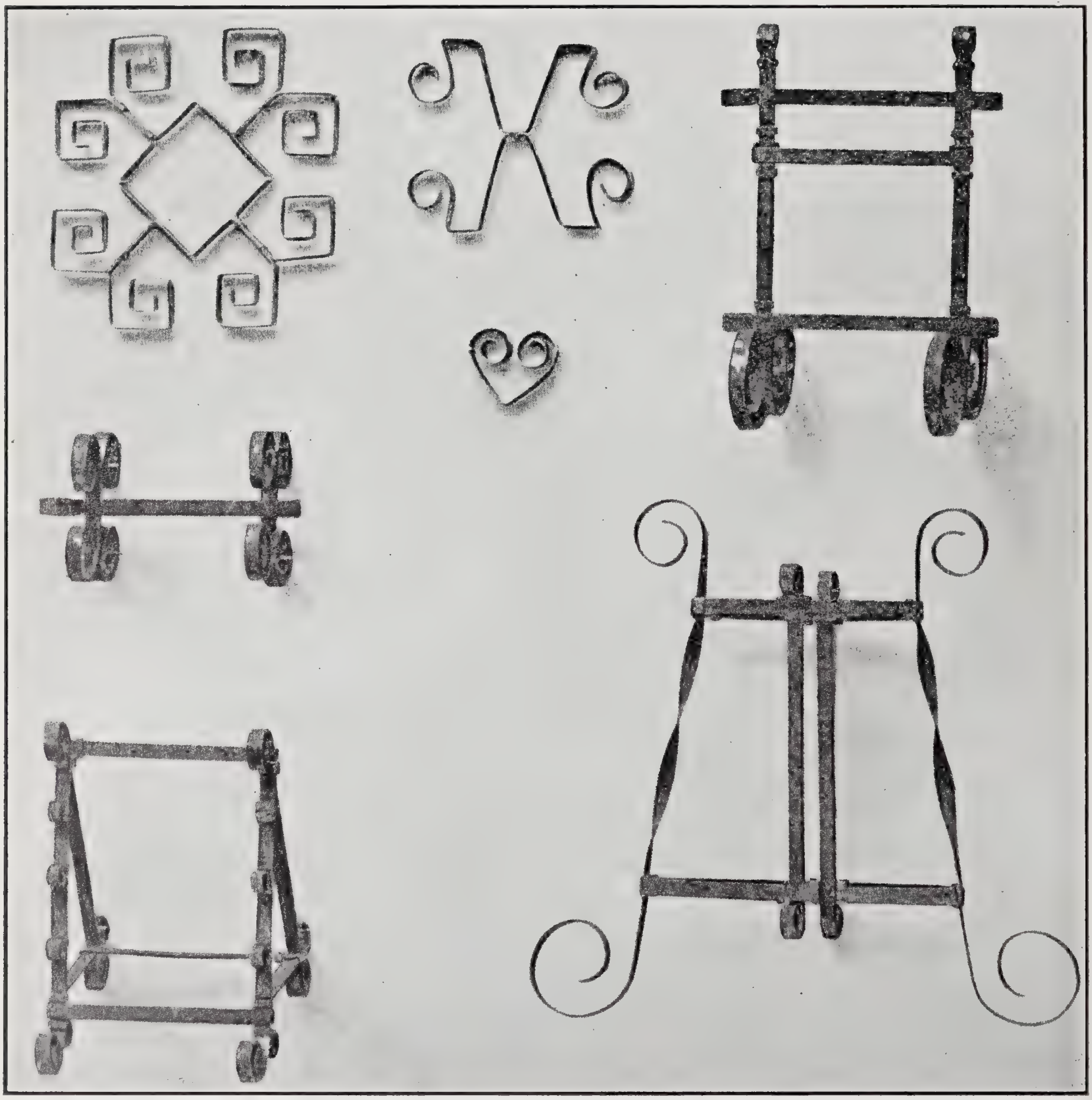
Suitable projects are key tag, key rack, pencil sharpener, string winder, calendar mount, card pocket, marble board, scissors rack, fish-line winder, spool rack, letter opener, paper knife, match box, brackets. etc. The tool exercises involved in the various articles in this course, should include whittling with the grain, across the grain, and oblique convex and concave whittling, sawing across the grain, sandpapering, boring with gimlet, and fastening pieces together with glue and nails. This work should prepare the pupils for the more advanced work in thin metals, and wood to be given in the upper grades. Each pupil should make his own drawing, but, for variety and practice in reading, he may occasionally be allowed to work from a carefully dimensioned and prepared blackboard drawing or blue print. Twigs and small branches from the trees may be sometimes used with good effect, as shown in the illustrations above. (See also illustration on p. 25.)



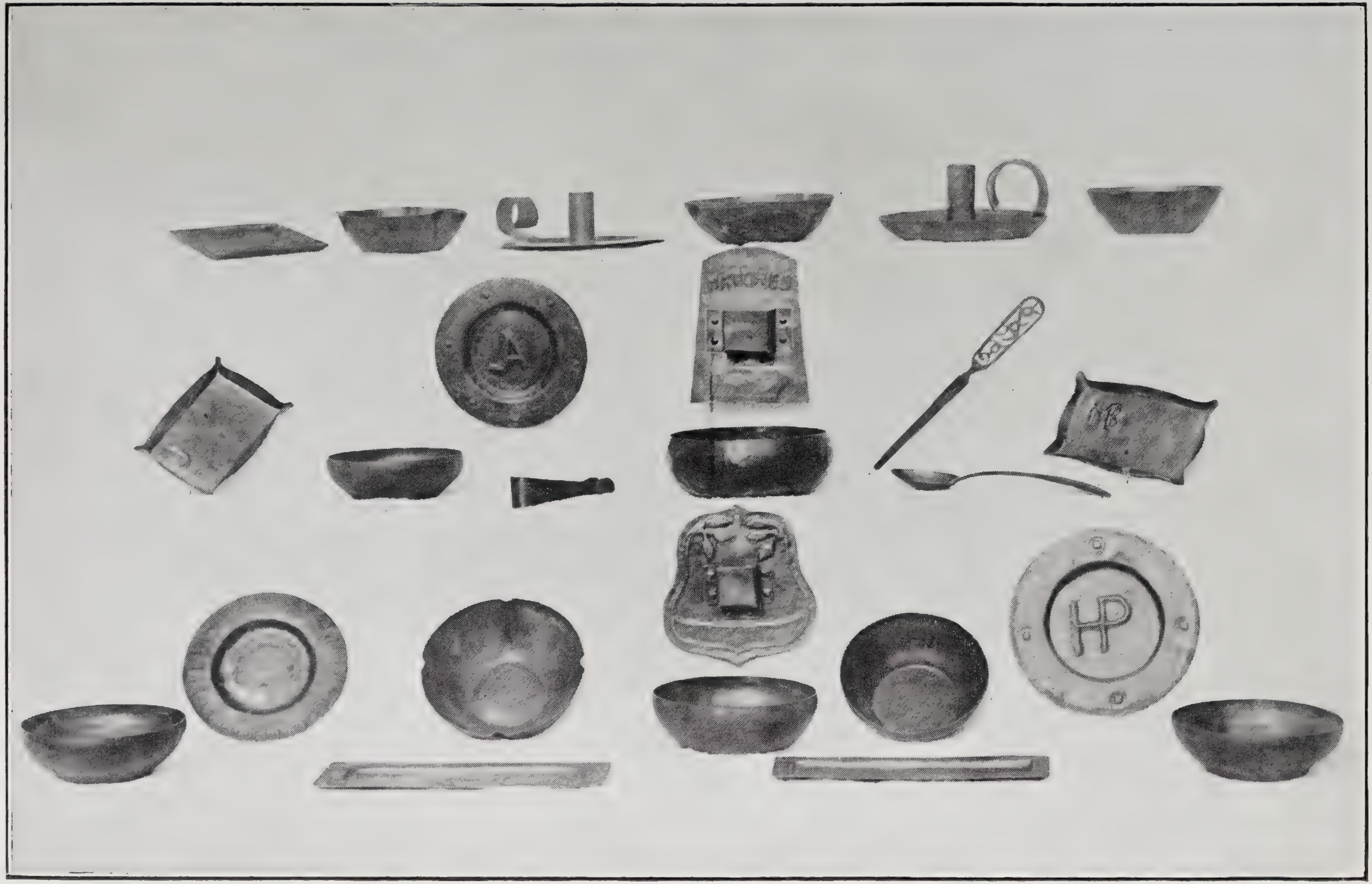
Knife Work in Thin Wood.

Bent Iron and Thin Metal Work. This is a useful form of work, especially valuable from the point of view of design. It can be carried on at the ordinary bench with very few additional tools. The material is sold in coils of fifty feet, varying in width from one-eighth to one-quarter of an inch. One quarter inch is the best for general use. Binders of the same width as the iron can be bought in packages of 100. Small wire for binding cross pieces will also be necessary. Very occasionally a piece of heavier iron may be needed, and this can be obtained from the blacksmith's shop. Norway iron is best, as it can be bent cold without breaking. Strips of wood can be used for some purposes, and blackened when finished. When wide bands are required, they may be of sheet tin. To keep the finished object from rust, and to preserve the character of iron, it is best to paint it all over with a dull black.

Much practice should be given with the C. and S. curves, as many designs are formed from these and their combinations and modifications. The object to be made should be sketched, care being taken to keep the design simple. Strength and beauty of construction always depend on a few bold lines. After the sketch has been criticized, corrected and accepted, a full sized drawing should be made on heavy Manilla paper. The object of the working drawing is to enable the pupil to see the exact size and shape of each piece of iron as it is being formed. The work should be constantly placed on the drawing as a test. Such objects as the following afford useful exercises :—letter rack, vase mount, match holder, candlestick, photograph frame, flower pot holder, tea pot stand, wall bracket, candle bracket, cake dish frame, hanging vase holder, grille, newspaper rack, lantern, etc. Many beautiful and useful objects may be made out of thin sheet copper as shown in the following illustration :

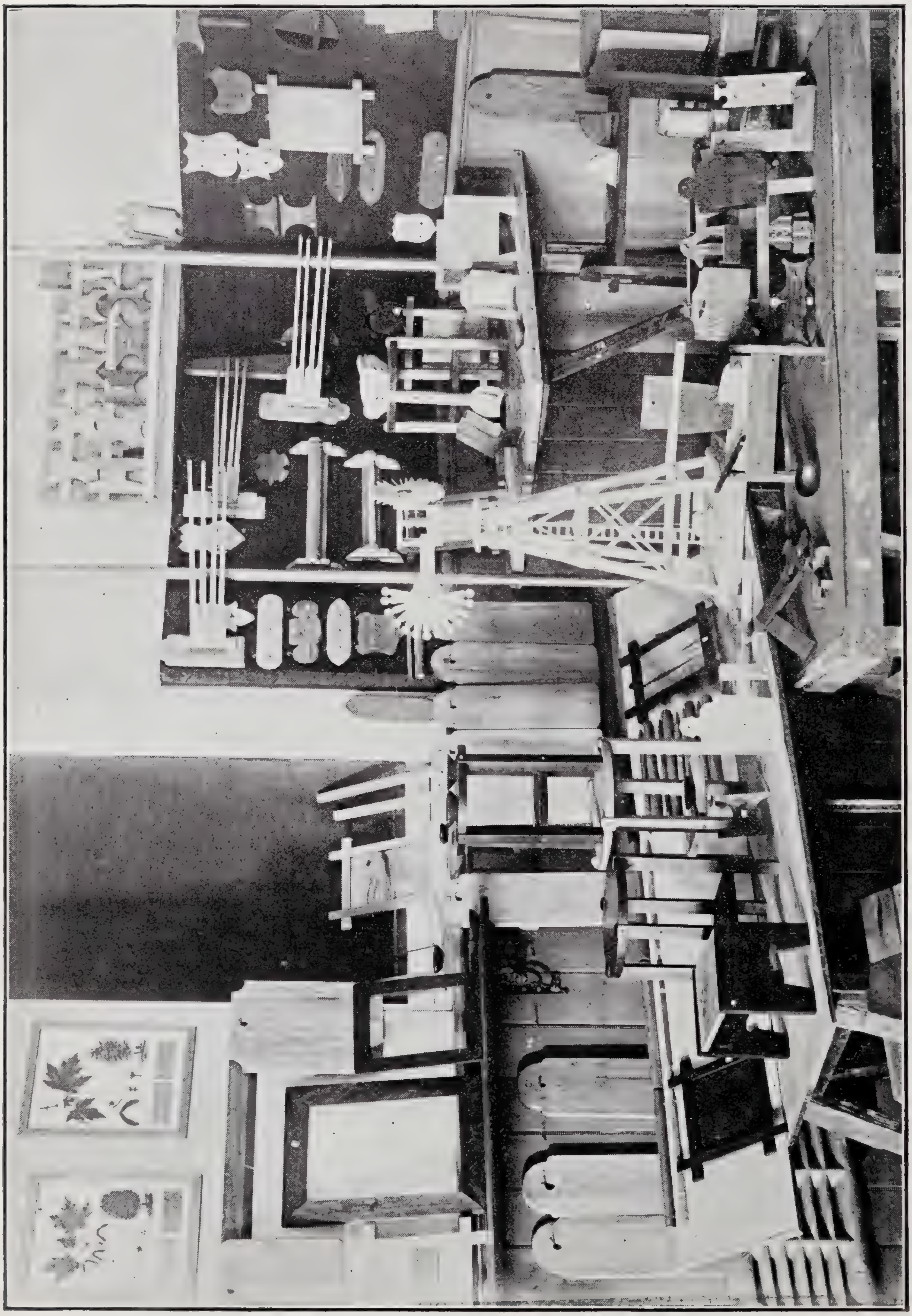


Bent Iron Work.



Work in Thin Sheet Copper and Brass.

Bench Work. The equipment for this work has already been outlined, and by careful organization a large number of pupils may be served by a small equipment. Selection of objects here is difficult as the choice is so wide. A group of objects made in one school is shown below. The projects should be well within the capacity of the



Manual Training—Woodwork.

pupils and correct workshop methods should always be employed. Too much time should not be spent on one piece models, as the need for accuracy is not so evident as when two or more pieces have to be fitted.

A fair amount of accuracy should be insisted upon. ''According to drawing'' should be the test. Attention should be given to ''repairing'' as well as ''making.'' Objects might be allowed to be brought from home for this purpose, and the school itself will often provide opportunities.

In this and other parts of the course the cost of the material in bulk should be given, a money value set on the time of the boy and the total cost of the finished object worked out. The problem of the modern shop is time and cost, and no pupil should complete this course without some knowledge of both. The work should be so organized that the noisy processes such as hammering and sawing, etc., do not disturb other school subjects. The pupils should in the end be able to sharpen their own tools.

Much attention should be directed to the mechanical features of construction—joints, various methods of fastening, etc.,—to be found in buildings, bridges, doors, windows, drawers, boxes, etc., and the pupil encouraged to examine from a structural point of view, every object he meets with.

MISCELLANEOUS.

There are many forms of work other than those mentioned, and every effort should be made to give the work as wide a bearing as possible. Painting, glazing, chair caning, repairing harness, mounting and framing pictures, apparatus making for school use, repairing locks and latches, simple wood turning, soldering, garden carpentry, fitting shelves, etc., should all be taken up wherever possible.

One of the leading features of modern shop practice is ''division of labour,'' and this principle should be applied to one or two problems during the school course. A large project should be selected, each part of which is to be constructed by a different student. During its process the pupil learns that he must fit in to the general scheme of things, and that his work must be well done or it will spoil the whole when the parts are assembled. The possibilities of this method from an industrial and educational point of view are great, and they should be carefully worked out. Labour saving devices should be used as far as possible in order to reduce cost and bring conditions as close as possible to those prevailing in the shop.

CORRELATION.

The extent to which industrial work or vocational training may be correlated with ordinary school subjects is very great. The making of scientific apparatus adds life and vitality to science teaching. Descriptions of tools and processes are practical exercises in composition. Calculations of time, cost and material provide a kind of workshop mathematics that will prove most valuable. The study of the growth of timber, seasoning, warping, etc., offer practical nature study, and in fact, the points where this subject may touch and help other studies are only limited by the resourcefulness of the teacher.

This pamphlet contains suggestions only, and makes no pretensions to completeness. The Minister leaves each district as free as is consistent with efficiency to develop its own course in conformity with the industrial requirements of the local industries.

HELPFUL BOOKS.

Trade papers, catalogues, and magazines should be constantly in use, and books on practical subjects added to the school library. A partial list follows. These should be gradually purchased as opportunity offers :

Theory.

Among Country Schools. Kern. Ginn and Co., Boston.

Industrial Social Education. Baldwin. Milton Bradley Co., $1.50.

Place of Industries in Elementary Education. Dopp. University of Chicago Press, $1.00.

Working with the Hands. Booker Washington. Briggs, Toronto

Educational Foundations of Trade and Industry. Ware. Appleton and Co., $1.20.

Drawing and Design.

Prang's Text Books of Art Education. Eight numbers. Geo. M. Hendry Co., Toronto, 25c. to 90c.

Lettering. Steeley. Bacon and Co., London, Eng., 2/6.

Principles of Design. Batchelder. Inland Printer Co., Chicago, $3.00.

Design, The Making of Patterns. Hatton. Chapman and Hall, 5*s*.

Mechanical Drawing. Cross. Ginn and Co., Boston, $1.00.

School of Art Geometry. G. Gill and Sons, London, Eng., 2/6.

Paper and Cardboard.

Correlated Handwork. Trybom and Heller. Speaker Printing Co., Boston, $1.25.

Busy Hands. Booker. Flanagan Co., Chicago.

Industrial Work for Public Schools. Holton and Rollins. Rand McNally, 90 cents.

Seat Work and Industrial Occupations. Gillman and Williams. Macmillan, 50 cents.

Paper Sloyd for Primary Grades. Rich. Ginn and Co., Boston, 85 cents.

Pretty Pursuits for Children. Butterick Publishing Co., N.Y., 25 cents.

Pleasant Pastimes for Children. Butterick Publishing Co., N.Y., 25 cents.

Manual Training Schedule. New York Board of Education. Free.

Paper Modelling. Swannell. Philip and Son, London, England, 2/6.

CLAY.

Clay Modelling for Little Ones. Pearce. Philip and Sons, London, 9d.

Clay Modelling. Gordon. Charles and Dible, London, 1*s*.

Clay Modelling. Holland. Ginn and Co., Boston, $1.00.

Plaster Casts and How They are Made. Frederick. Comstock, N.Y.

Clay Work. Lester. Manual Arts Press, Peoria, Ill., $1.25.

KNIFE WORK.

Wood Work in the Common School. Hinckley. Milton Bradley Co., $1.00.

Knife Work in the School Room. Kilbon. Milton Bradley Co., $1.00.

Easy Woodwork. Field. Newman and Co., London, England.

Elementary Knife Work. Hammell. B. F. Johnson Pub. Co., Richmond, Va., 25 cents.

Advanced Knife Work. Hammell. B. F. Johnson Pub. Co., Richmond, Va., 25 cents.

METAL WORK.

Copper Work. Rose. Manual Arts Press, Peoria, Ill., $1.50.

Bent Iron Work. Erskine. Scribner, New York, 25 cents.

Metal Work. Leland. Whitaker and Co., London., 5*s*.

Venetian Iron Work. Butterick Publishing Co., 25 cents.

BENCH WORK.

Art Crafts for Beginners. Sanford. Century Co., N.Y., $1.20.

Joints. Cristy. Crosby, Lockwood and Co., 3*s*.

Woodworking for Beginners. Wheeler. Putnam and Sons, N.Y., $2.50.

Mechanics Own Book. Spon and Chamberlain, N.Y.

Picture Frame Making for Amateurs. Lukin. Cassels and Co., 1*s*.

Handyman's Book. Hasluck. Cassels and Co., 9*s*.

Elementary Woodwork. Forster. Ginn and Co.

Primer of Forestry. Pinchot. Bulletin 24. Agriculture Department, U.S.A., 25 cents.

Our Native Trees. Keeler.

Educational Woodwork for School and Home. Park. The Macmillan Co., Toronto.

SUPPLY OF TEACHERS, ELEMENTARY INDUSTRIAL ARTS.

By arrangement with the Minister of Agriculture, the Minister of Education has established a course at the Ontario Agricultural College, Guelph, in order to provide teachers with second class certificates, competent to give instruction in Elementary Industrial Arts, in addition to the ordinary subjects of the Public and Separate Schools. At the session just closed, a considerable number obtained certificates in these subjects and are now open to engagement by School Boards, which may obtain their services by advertisement or on application to the Deputy Minister of Education, who will supply a list of such teachers with their addresses.

July, 1909.